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1. A method for attaching solder balls to a substrate having conductive pads in a predetermined pattern comprising:
- 5 providing a carrier for the substrate;  
inserting the substrate into the carrier;  
providing an alignment plate comprising a plurality of through-holes in a pattern which corresponds to the predetermined pattern of the conductive pads of the substrate; said through-holes having a diameter slightly larger than the diameter of the solder balls;
- 10 placing the alignment plate over the substrate so that the through-holes of the alignment pad are aligned directly above the conductive pads of the substrate;  
inserting a solder ball into each hole of the alignment plate whereby each solder ball falls into contact with a conductive pad of the substrate;  
heating the alignment plate and substrate sufficiently to at least partially melt the
- 15 solder balls;  
cooling the alignment plate and substrate sufficiently to resolidify the solder balls which bond to the conductive pads of the substrate in the predetermined pattern; and  
removing the alignment plate; and  
removing the substrate from the holder.
- 20 2. An apparatus for attaching solder balls to a substrate having a plurality of conductive pads in a predetermined pattern comprising:
- a carrier for the substrate;  
an alignment plate comprising a plurality of through-holes in a pattern
- 25 corresponding to the predetermined pattern of the conductive pads of the substrate;  
means for inserting a solder ball having a diameter slightly less than the diameter of the through-holes of the alignment plate into each hole of the alignment plate;  
means for heating the alignment plate and substrate to a temperature sufficient to melt at least the surface of the solder balls.
- 30 3. A substrate comprising a plurality of solder ball interconnects fixedly attached to the surface of the substrates wherein the solder ball interconnects have a shape comprising a generally spherical head region and a curved neck region between the head region and the substrate surface, the minimum diameter of the neck region being smaller than the maximum
- 35 diameter of the head region.

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4. A substrate as claimed in claim 3 wherein the variance in the coplanarity of the solder ball interconnects is less than 10% of the average height of the solder ball interconnects.

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